1988

D.A.T.E.

Demonstration of
Agricultural
Technology and
Economics projects

BC
Ministry of Agriculture and Fisheries
Hon. John Savage, Minister

1988

D.A.T.E. PROGRAM REPORT

Demonstration of Agricultural Technology and Economics

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The Committee is appreciative of the work done by Teresa Adams in the typing of this report.

Province of British Columbia Ministry of Agriculture and Fisheries
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TERMS OF REFERENCE

D.A.T.E. funds may be used for:

1. Evaluating and demonstrating known technological advances for enhancing the production, processing and marketing of agricultural products.

2. Supporting adaptive research projects aimed at solving priority problems confronting British Columbia agriculture.

3. Investigating production, processing and marketing systems to identify or substantiate the need for new technology.

4. Supporting mission-oriented trips with the objectives of: investigating innovative production, processing and marketing techniques for import or ultimate adoption in this province; and/or investigating export opportunities for British Columbia agriculture and fisheries technology.

5. Importing expertise to assist in introducing new technology or to advise on critical problem situations.

1988-89 D.A.T.E. PROGRAM

The D.A.T.E. (Demonstration of Agricultural Technology and Economics) Program provides funding for British Columbia Ministry of Agriculture and Fisheries staff supervised projects.

Twenty-four new on-going projects were reported on during 1988-89. Included below are highlights from a few of the areas studied.

- The establishment of kiwifruit in British Columbia has been supported by the D.A.T.E. Program since 1984. During 1988, the B.C. Kiwifruit Growers' Association packed and sold 250,000lbs of fruit valued at over $300,000.00. There are 55 acres of kiwifruit vineyard in production. They are expected to yield 1,000,000lbs of fruit by 1990.

- The use of antagonistic plants in the control of root lesion nematode proved effective in young apple tree plantings. It was clearly shown that the marigold, Tagetes patula cv. "Harmony", in one season will reduce nematode populations to very low levels. Other plants, such as creeping red fescue and red top grass, also proved effective. The use of antagonistic plants in this way is a cost effective and safe way of controlling nematodes.

- There was on-going work on vegetable disease, quality and marketability. Included in these studies were carrots, celery, potatoes and lettuce. A project on Fusarium Yellows (a disease of celery) identified resistant varieties. Most growers have shifted their production to these varieties in response to the findings of the project.

- Two projects responded to the aquaculture industry's research needs. One field tested a new vaccine for its effectiveness in preventing bacterial kidney disease in farmed salmon. This project will be continued in 1989-90. The second aquaculture project funded the cost of bringing Dr. Shiroh Uno from Nagasaki, Japan, to British Columbia to provide information which will help fish farmers limit stock losses due to plankton blooms.

- The British Columbia Ministry of Agriculture and Fisheries harvest aid was modified to reduce handling damage of vegetables during harvest. Modification eliminated all conveyance transfer points. It worked well during the 1988 cauliflower harvest.

The D.A.T.E. Program Committee would like to acknowledge the co-operation of the project supervisors in the implementation of the 1988-89 D.A.T.E. Program. It continues to be a very valuable vehicle for carrying out research and demonstration projects.

KIWIFRUIT ESTABLISHMENT IN B.C.

Mrs. Jean Vantreight, Vantreight Farms, and Ronny Quay, B.C.M.A.F., inspecting 1988 crop being packaged.

Project Number: 181

Supervision: Brent Warner, New Crop Development Specialist, Sidney

Co-operators: Agriculture Canada (New Crop Development Fund)
Kiwifruit Growers' Association of B.C.
Vantreight Farms, Victoria
Rod Chilton, Contract Climatologist
Nick Pyke, Peter Alsbach, New Zealand M.A.F. D.S.I.R. Research Scientists

Branch: Development and Extension, South Coastal Region

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Funding:

D.A.T.E. 1984/85 - $21,300
D.A.T.E. 1986/87 - $11,500
D.A.T.E. 1987/88 - 2,000
D.A.T.E. 1988/89 - 5,850

Objectives:

1) To complete the final year of the joint Agriculture Canada N.C.D.F., B.C. Ministry of Agriculture D.A.T.E. project on the establishment of commercial kiwifruit production in B.C. which included the following:

a) further soil tissue testing to establish the nutritional requirements for this crop;

b) organization and coordination of the Second International Kiwifruit Culture Symposium in B.C.;

c) pollination studies to assess the effectiveness of various artificial pollination procedures;

d) preparation of a growers' handbook for Canadian Kiwifruit Culture to be available in 1989.

Summary:

As of March 31, 1989, this joint N.C.D.F./D.A.T.E. project will have been completed. When this program began in 1984-85 there were no commercial plantings in B.C. and fruit was not being grown in Canada.

During 1988, the B.C. Kiwifruit Growers' Association packed and sold 250,000lbs of fruit with a value of over $300,000. This crop was produced on 55 acres of kiwifruit vineyard which should yield approximately 1,000,000lbs of fruit by 1990.

The second Kiwifruit Culture Symposium held on July 20, 1988 attracted over 80 participants from both Canada and the U.S. to listen to speakers from B.C., Ontario, California and New Zealand. The growers' handbook, which will be distributed by the B.C. Kiwifruit Growers' Association and funded by this project, will ensure that cultural recommendations based on B.C. conditions are available to new growers.

INTENSIVE APPLE PLANTING DEMONSTRATION PROJECT

Ted Ritchie, co-operator, on left, with Dr. Hermann Oberhofer of South Tyrolia, Northern Italy.

Project Number: 200

Supervision:	M. Sanders, Provincial Tree Fruit Specialist, Kelowna Dr. H. Quamme, Pomologist, Agriculture Canada, Summerland N. Filipenko, Naramata Co-operative, Naramata
Co-operators:	Ted Ritchie, Orchardist, Naramata
Branches:	Development and Extension, Southern Interior Region Farm Management

Funding: Joint - D.A.T.E./New Crop Development Fund/Ted Ritchie - approximately $20,000 over 5 years.

Objectives: To demonstrate four apple training systems in a commercial orchard using McIntosh. The systems chosen are U.S.D.A. Central Leader, Van Roechoudt Trellis, Central Axe and Slender Spindle. Rootstocks are M9 and M26.

An annual economic analysis will be prepared showing costs and returns for each combination under trial.

Summary: Trees were planted in spring of 1987 and appropriate support systems were installed. The overall nursery tree quality was generally poor but growth in 1987 and 1988 was good. Because of the poor quality trees, small crops were obtained from all systems in 1988. Yields are expected to show good increases over the next several years.

There were three major tours of the trials in 1988. In addition to providing financial information about the systems under test, the tours provided a good learning experience for many growers concerning intensive production systems. Visiting horticulturists, Dr. Bob Werthein from Holland and Dr. Hermann Oberhofer from Italy, gave pruning demonstrations at the site.

Different techniques have been tried on each of the systems to identify the ones best suited to Okanagan conditions.

RENOVATION OF KNAPWEED INFESTED RANGELAND

18-Fold increase in range grass production.

Project Number: 203

Supervision: R.S. Cranston, Provincial Weed Specialist, Cloverdale

Co-operators: F. Hart, Thompson-Nicola Regional District
B.C. Hydro and Power Authority
P. Edwards, Rancher

Branch: Crop Protection

Funding: D.A.T.E. 1985/86 - $1,000
Co-operators 1985/86 - $4,665

Objectives: To determine and demonstrate the most cost effective long term method for renovation of heavily infested knapweed rangeland.

Summary: Project work commenced, on 20 hectares of heavily knapweed infested range, with picloram herbicide application in May, 1985 and seeding to crested wheatgrass/orchardgrass mix in October, 1985. Final project components including fertilization were completed in the fall of 1986. This project compares the following weed management systems: native untreated range; spring herbicide application followed by fall seeding; fall seeding followed by early summer herbicide application; native infested range sprayed only; and native infested range seeded only.

To date, the superior treatments have been fall seeding, followed by early summer application of picloram at 0.28kg/ha a.i. followed with a fall application of nitrogen fertilizer (100 and 200 kg/ha N). These treatments have yielded 100 per cent knapweed control and 18 fold increase (200 kg/ha N) and a 16 fold increase (100 kg/ha N) in grass production over native infested range.

Direct seeding alone into knapweed infested range has resulted in a 5 fold increase in forage production but also a 24 per cent increase in knapweed due to resultant soil disturbance. Fertilization alone resulted in a 2 fold increase in native grass production but also a 4 fold increase in knapweed.

Project components will be monitored for a number of years in order to determine the most cost effective treatment over time.

CAUSE AND CONTROL OF CELERY YELLOWS

1988 Celery Yellows plots showing cultivar susceptibility, biological control treatments and fumigation trial.

Project Number: 230

Supervision: David J. Ormrod, Plant Pathologist, Surrey, B.C.

Project Staff: Maged Said, Cloverdale Lettuce and Vegetable Co-op

Co-operators: Wayne Odermatt, P.Ag., Fresh Vegetable Specialist
Harvie Snow, Horticultural Technician, B.C.M.A.F.
Mary-Margaret Gaye and Dr. Jim Menzies, Agriculture Canada, Agassiz
Dave Brar, celery grower, Cloverdale

Branch: Crop Protection

Funding: D.A.T.E. 1987/88 - $4,000
D.A.T.E. 1988/89 - $6,000

Cloverdale Lettuce & Vegetable - 1987/88 - $5,000
Cloverdale Lettuce & Vegetable - 1988/89 - $6,000

Objectives: Fusarium Yellows is the most serious problem of celery in the Cloverdale area at the present time. When susceptible cultivars, such as T.U. 52-70R and Florida 683, are grown on infested land, the plants become stunted and yellow and fail to reach marketable size. Large areas or whole fields have to be ploughed down. To further identify the problem and potential control measures for Cloverdale growers, the objectives in 1988 were:

1) To carry out a detailed survey of all celery crops on 17 farms in the Cloverdale area to delimit the distribution of Fusarium Yellows.

2) To compare the susceptibility of 12 celery cultivars in a heavily infested field.

3) To compare Vapam and methyl bromide fumigation of infested soil.

4) To evaluate Bacillus subtilis, Talaromyces flavus, Trichoderma sp. and a mixture of three avirulent Fusarium spp. as celery root dips for biological control.

5) To carry out greenhouse and laboratory pathogenicity tests.

Summary: 1) Fusarium Yellows was found on 8 of 17 farms surveyed in 1988. This compares with 14 of 20 in 1987. Most growers have shifted their production to resistant cultivars in response to the on-going findings of this project.

2) T.U. 52-70HK, Tendercrisp and Deacon were the best producers on infested soil while Florida 683, Napoleon and T.U. 52-70R were the poorest. Pilgrim and Bishop were intermediate.

3) Both soil fumigants gave yield increases greater than could be explained on the basis of Fusarium control alone. Methyl bromide was significantly better than Vapam at the equivalent rate of application.

4) None of the biological control root dips gave any protection to celery seedlings planted in infested soil.

5) The growers are planning to carry on cultivar testing at their own expense in 1989. There are no immediate plans for further soil fumigation or biological control research.

DEMONSTRATION OF SELECTED GRASS SPECIES PERFORMANCE VERSUS PERFORMANCE OF NORDAN CRESTED WHEATGRASS ON CHILCOTIN GRASSLANDS

Project Number: 231

Supervision: Don Blumenauer, Provincial Range Specialist, Williams Lake

Co-operators: Ministry of Forests, Range Branch, Williams Lake
Dr. B. Holl, U.B.C.
Gang Ranch
Meldrum Creek Permittees

Branches: Crop Protection
Soils and Engineering

Funding: D.A.T.E. 1986/87 - $3,000
Crop Protection - 1986-88 - $1,500
Ministry of Forests - 1987/88 - $1,000

Objectives: 1) To demonstrate and evaluate performance of selected grass cultivars versus Nordan crested wheatgrass. Nordan, currently the preferred grassland species, has initially established well on Chilcotin grasslands but productivity and vigor have declined significantly 5 years after seeding.

2) To monitor seeded species competitiveness to encroaching Kentucky Bluegrass.

3) To evaluate potential productivity increases of 5 inoculant strains on seeded species.

4) To demonstrate the feasibility of battery powered single strand smooth wire electric fencing for low cost control of grazing livestock.

Summary: 14 grass cultivars were seeded with B.C. Ministry of Agriculture and Fisheries range seeder on two sites - Leeches Lake (Meldrum Creek) and Big Flat (Gang Ranch), October 1986. Each cultivar was seeded in 4¼ acre replicates on both sites. 5 strains of inoculant (Dr. Holl, U.B.C.) were applied to 2 replicates of 5 grass species at time of seeding on the Big Flat site. Single strand smooth wire with steel posts was constructed on both sites and electrified by battery power during the grazing season 1987/88. Batteries were buried in water tight boxes to minimize vandalism.

No germination of seedings occurred until May 1988 due to severe drought and very low snowpack in 1986 and 1987. Extreme heat in 1988 reduced growth although germination was fairly good. Some grazing of both sites inadvertently occurred due to battery failure and fence vandalism.

Observations:

1988

Inoculated seed appears slightly superior in productivity at this stage on Nordan and Fairway Crested Wheatgrass.

All Crested Wheatgrass cultivars are equal in productivity and 20-50% higher than other species. Hard Fescue, Western Wheatgrass, Intermediate Wheatgrass and Sherman Big Bluegrass also show promise with October protein % of 6.5 and TDN % of 60%+. Aeration of the soil during seeding appears to greatly enhance vigor and productivity of all Crested Wheat cultivars and competitiveness with Kentucky Bluegrass.

1989

"Hycrest" Crested Wheat will be seeded on site in April. This new variety has shown significantly greater production than other Crested Wheat varieties on a demonstration plot seeded on Alkali Lake in 1988. Nutritional and dry matter sampling will be conducted throughout 1989 growing season.

IMPROVEMENT OF NATIVE STAND CHRISTMAS TREE PRODUCTION

Portable Christmas tree shearing machine in use on East Kootenay native stands.

Project Number: 236

Supervision: Richard Hallman, District Horticulturist, Creston

Co-operators: Kootenay Christmas Tree Association
Dave Kent, Media Production Centre, Kelowna
George Geldart, Regional Economist, Vernon
Mike Malmberg, District Agriculturalist, Cranbrook
Carol Barnett, Provincial Nursery Specialist, Abbotsford
Rick Fornier, Faculty of Forestry, U.B.C.

Branch: Development and Extension, Southern Interior Region

Funding: D.A.T.E. 1987/88 - $ 6,885
D.A.T.E. 1988/89 - $11,500

Objectives: 1) To determine methods to improve the rate of growth, stocking rates and quality of native grown Douglas Fir Christmas trees.

2) To develop a production cost model to evaluate the profitability and financial implications of cultural practices of native grown Christmas trees.

3) To develop audio-visual teaching aids for use in extension programs on native Christmas tree production throughout the province.

Summary: The production of native stand Christmas trees is an important industry in the East Kootenay area. The industry has been reacting to market problems and changing consumer preferences by producing fewer and fewer trees over the last 25 years. Through the activity of this project and the Kootenay Christmas Tree Association, it is hoped that the production decline will cease and that returns to growers will improve.

Foliage diseases are a significant concern for Christmas tree growers. In the East Kootenay they cause considerable needle drop and quality problems in cut Christmas trees. Most growers did not understand what the problem was or what could be done about it. During 1988, this project:

- conducted a disease survey on Christmas tree stands
- developed a display to explain the causes of needle drop
- obtained and developed audio-visual presentations on the disease and controls
- discussed field identification of disease and insect problems at Association meetings and field days.

The tremendous labour input required to develop and maintain a native stand Christmas tree operation was identified as a significant constraint to the development of the industry. To deal with this problem, the project has been and will be demonstrating labour saving equipment. This equipment is in the form of portable motorized machines. They are a Christmas tree shearing machine, a motorized back-pack sprayer/fertilizer spreader and a clearing saw.

Fertilizer demonstration plots have been established at six locations in the East Kootenays. These plots are being used for field days to demonstrate what fertilization can do to improve tree quality production capability of stands. The Christmas tree computer cost model for native stands is, necessarily, a very complex program. The first prototype is scheduled for testing during the spring of 1989. Data collection validate the program is underway.

Transfer of methods and equipment used in other areas is being promoted by this project. An extension agent experienced in native stand Christmas trees was brought to the East Kootenays from the Seattle area in the spring of 1988. Richard Hallman will travel to the spring 1989 meeting of the Northwest Christmas Tree Association to identify methods used in the Oregon industry which are of value in B.C.

IMPROVED MARKETABILITY OF B.C. LETTUCE

Project employee at one of the six cultivar plots.

Project Number: 238

Supervision: W.J. Odermatt, Regional Fresh Vegetable Specialist, Cloverdale

Project Staff: Julie Priddle

Co-operators: Harvie Snow, Development and Extension
G.B. Bush, Manager, Cloverdale Lettuce & Vegetable Co-op
Sprangers Farm
Cloverdale Produce Farm
H. Wong Farm
Pacific Vegetable Farm
John Yue Farm

Branch: Development and Extension, South Coastal Region

Funding: D.A.T.E. 1987 - $5,000
D.A.T.E. 1988 - $4,000

Cloverdale Lettuce & Vegetable - 1987 - $5,000
Cloverdale Lettuce & Vegetable - 1988 - $4,000

Objectives: To improve the marketability of B.C. lettuce by:

a) identifying iceberg lettuce varieties with better keeping qualities than the current industry standard, Ithaca;

b) identifying factors that may be contributing to shorter shelf life.

Iceberg lettuce sales locally and to the prairies have been declining since the mid-seventies. According to the trade, the perceived main reason is poor shelf-life. Thus, it is imperative for the health of the industry that factors affecting shelf life be determined and varieties with better storage capabilities be identified.

Summary: Twenty iceberg lettuce varieties were evaluated for field and storage quality. The variety trials were carried out on five different farms in the Cloverdale area. Plantings were made from May to July 1, 1988.

Lettuce was harvested as it matured and was then packed, labelled and taken to the co-op for vacuum cooling and storage. Stored lettuce was evaluated after two and three weeks for the development of post-harvest disorders and was rated for marketability.

The harvest and storage data have identified several varieties with potential for commercial production in the Cloverdale area. Most promising are Salinas, Green Lake, Amaral and Kelvin which performed well both in 1987 and 1988.

To get maximum shelf life from these varieties, however, requires that the growers reduce nitrogen fertility in the "Salinas" types (Salinas, Amaral, Kelvin) to avoid large, soft heads and tipburn. If the heads are still too large, a larger carton should be used. This will reduce physical damage and rots.

Acting on the preliminary results of the 1987 field work, several producers tried some of the new varieties and modified cultural practices in 1988 with generally satisfactory results.

Further work is required to come up with the best variety/fertility/handling combination for the Cloverdale area.

COW-CALF MANAGEMENT - SYSTEM FOR IMPROVED PRODUCTIVITY

Project Number: 244

Supervision: Kathy Sandy (1987 and Spring, 1988)/Wayne Haddow (November 1988 to present) - District Agriculturists, Dawson Creek

Co-operators: Ralf and Glenn Hogberg, beef producers, Progress, B.C.

Branches: Development and Extension, North Central Region

Funding: D.A.T.E. 1987/88 - $4,400
D.A.T.E. 1988/89 - $400

Objective: To demonstrate the potential for improved productivity through such management practices as shortening the calving season, performance testing, weaning earlier and artificial insemination. Weighing and sale results will also be used to comment on shrink.

Summary: In 1988, the calves were weighed at weaning (October 10) and performance indices were calculated. Average weaning weight was 607lbs, average cow weight was 1,194lbs and the average adjusted 200 day calf weight was 593lbs. Adjustments of 10% for first calf heifers, 5% for second calf heifers and 5% for heifers vs. steer calves were used.

Calving Season

Of the 115 cows calving, 44 calved in the first 21 days, 56 calved in the second 21 days, 11 calved in the third 21 days and 4 during the subsequent 14 days. 87% were calved in the first 42 days.

The objective has been to reduce the calving period to 60 days or less in order to reduce calving labour requirements and increase weaning weights. However, since 1986, the calving season has increased from 70 to 77 days (81 days in 1987). The co-operators feel the increase results from:

a) heavy culling in 1985 with cows being pregnancy checked and all late calvers being culled due to a drought reduced hay yield in 1985;

b) the fact that culling pressure was reduced in 1986 and 1987 due to abundant feed supplies and a desire to expand herd size;

c) heifer calving being moved ahead of the cow herd by one week during 1988.

The calves which were born in the last three weeks of the calving season weighed an average of 110lbs less than the herd average of 607lbs at weaning.

A.I. vs. Natural Breeding

52 cross-bred cows were bred via artificial insemination to Charolais sires and 33 cross-bred cows were naturally bred to Charolais sires. The 200 day adjusted weight for A.I. calves was 24lbs (4%) heavier than for calves from naturally bred cows. This level of improvement was expected, given the selection pressure on A.I. vs. local bulls.

Selection of Replacements and Culling

The co-operators have chosen to select replacements based on the adjusted calf weight as a percentage of cow weight (cow-calf ratio), in combination with lifetime cow performance and the heifers' 200 day index within the herd. Culling is based on physical condition and long term cow performance as major criteria. It is felt that further long term improvements can be made to weaning weights and cow-calf ratios as superior replacements are introduced into the herd.

Early Weaning

The October 10th weaning date is well suited to Peace River conditions. By mid-September, native and most tame pastures have reduced forage quality and provide poor rates of gain for calves. Cow/calf pairs held on poor pastures beyond the first week in October cause cow condition to decline. The co-operator strives to obtain good cow condition going into winter to promote positive results at calving and re-breeding.

Shrink

One week prior to weaning, all calves were exposed to hay on a free choice basis; calves were weighed just prior to loading on trucks. Weaning took place in the afternoon with loading completed by evening. Calves were delivered to two locations in South Central Alberta (approximate distance of 600 miles). At Strathmore, the calves were unloaded at 11:00 a.m. and weighed at 2:00 p.m. with no access to feed or water; 6.5% shrink was measured. At High River, a full day of feed and water was made available prior to sale weighing with 5.5% shrink occurring. Weather conditions were warm and dry with most highway travel at night. On average, the calves sold at Strathmore were larger than the calves sold at High River (larger/heavier animals should shrink less percentage/wise on average).

Plans

A second herd has been added in 1988 with plans to work with five or more herds in 1989. Cattle weighing provides an excellent extension opportunity.

THE VANCOUVER ISLAND DIRECT MARKETING ASSOCIATIONS

Project Number: 245

Supervision: B. Warner, New Crop Development Specialist, Sidney

Co-operators: Saanich Peninsula, Mid Island & North Island Direct Marketing Associations

Branch: Development and Extension, South Coastal Region

Funding: D.A.T.E. 1987/88 - $4,000
D.A.T.E. 1988/89 - $3,000

Objectives: To assist the three Regional Marketing Associations on Vancouver Island to continue to expand their advertising and promotional campaign to attract local consumers to their operations.

Summary: Three grower associations were established in 1987/88 with funding assistance from the D.A.T.E. program. All three were successful in adding new farmers during the 1988/89 year and in increasing the numbers of brochures printed and distributed. The Association on the Saanich Peninsula grew from twenty-three to thirty-five farms and the number of brochures distributed increased to 80,000. Other means of promotion were attempted. Plans are underway to use mail-outs and hand distribution of 100,000 brochures in 1989. This Association expects its membership to increase to forty for the following year. Meetings will also be held during the winter to assist local growers in determining pricing of their commodities in relation to their costs and to concentrate on marketing strategies for Direct Marketing Association.

IMPROVED POTATO QUALITY AND PRODUCTION EFFICIENCY

Collecting harvest yield data from a potato demonstration plot.

Project Number: 246

Supervision: Marney James, Provincial Vegetable Specialist, Cloverdale

Project Staff: Paul Ouellette, Potato Technician, Cloverdale

Co-operators: Neville Gough, Soil Specialist
Supervisor - Jim Harris, Commercial Grower, Delta
George Wright, Commercial Grower, Richmond

Branch: Development and Extension, South Coastal Region

Funding: D.A.T.E. 1987/88 - $5,500
D.A.T.E. 1988/89 - $2,000

Objectives: To develop a nitrogen fertilizer program for potatoes which maximizes production and quality while, at the same time, maximizing fertilizer efficiency and grower profitability.

Summary:

In keeping with the industry goal of improving quality and profitability in the potato industry, several nitrogen fertilizer programs, including the Idaho program, B.C.M.A.F. recommendations and traditional grower practices were evaluated in two Lower Fraser Valley "Russet Burbank" potato fields. Yield data, crop quality harvest dates and fertilizer usage were measured and evaluated for two consecutive years to determine the effect of each treatment on quality and production.

Results at both sites indicated that pre-plant nitrogen application had no effect on yield or quality. There was no significant difference in yield or quality between the control (no nitrogen) and any of the other treatments. Furthermore, although the petiole analyses showed a response to supplemental nitrogen applications, there was no yield or quality response to these applications.

A revised nitrogen fertility program for the Lower Fraser Valley potato growers would, therefore, propose considerably lower pre-plant nitrogen applications followed by regular petiole analyses to monitor nitrogen levels within the crop. This will result in improved fertilizer efficiency and, hence, greater profitability.

IMPROVED MARKETABILITY OF CARROTS

Carrots exhibiting deep ribbing which makes them hard to wash and unattractive in the market place.

Project Number: 247

Supervision: David Ormrod, Plant Pathologist, Surrey, B.C.

Project Staff: James C. Owen, B.C. Coast Vegetable Co-operative

Co-operators: W.J. Odermatt, P.Ag., Fresh Vegetable Specialist, B.C.M.A.F., Cloverdale
B.C. Coast Vegetable Co-op, Richmond
Cloverdale Produce Farms
Maddock's Farms
Pacific Vegetable Farms
Spranger's Farms

Branch: Crop Protection

Funding: D.A.T.E. 1987/88 - $4,000
D.A.T.E. 1988/89 - $4,000

B.C. Coast Vegetable Co-op - 1987/88 - $2,984
B.C. Coast Vegetable Co-op - 1988/89 - $1,931

Objectives: Most of the British Columbia carrot crop is grown in the Lower Fraser Valley, mainly on the muck soils in the Cloverdale area. Physical disorders such as poor shape, cavity spot, black root rot and ribbing reduce marketable yield and also consumer acceptance. Losses due to cavity spot and black root rot have been reduced as a result of studies carried out under previous D.A.T.E. projects. The current study deals with the factors contributing to ribbing.

The 1988 work consisted of a field survey of four farms in the Cloverdale area and irrigation trial on one of the same farms.

Summary: In the 1987 survey, 35 carrot fields on eight farms were surveyed and it was found that ribbing was a problem in the mixed organic/clay soils but not in sandy or deep organic soils. In 1988, 18 fields on four farms were surveyed and, again, it was found that a deep organic soil on one farm had less ribbing than the mixed organic/clay soils on the other three farms.

In 1987, the earliest seeded crops had the least ribbing but in 1988 there were no noticeable differences associated with seeding date.

In 1987, there were no clear differences in smoothness of cultivars across all soil types. In 1988, the cultivars Nantes, Six Pak and Clarion were more than 10% smoother than the mean of all cultivars while Spartan Fancy, Orlando Gold and 24 Karat were more than 10% more ribbed than mean.

In the irrigation trial, carrots grown under a schedule of one inch of sprinkler irrigation each week were slightly smoother than those given three inches every three weeks.

Growers in the Cloverdale area have been advised as follows:

1) avoid degraded mucks with increasing clay content if possible;

2) maintain soil organic matter through regular additions of livestock manure or green manure;

3) screen varieties on a small scale, on-going basis to determine which are best for their particular farm;

4) maintain uniform soil moisture during the growing season;

5) grow carrots on high, well-prepared beds.

EVALUATION OF MICRO SPRINKLERS AS A METHOD OF FROST PROTECTION

Spring blossoms in the Okanagan Valley.

Project Number: 259

Supervision: T.W. Van der Gulik, Agricultural Engineer, Abbotsford

Project Staff: Peter Waterman, District Horticulturist, Penticton
Erich Schulz, Engineering Technician, Victoria

Co-operators: Robert Cropper, Courtenay
Ken Clement, Ellison

Branch: Soils and Engineering

Funding: D.A.T.E. 1987/88 - $1,500
D.A.T.E. 1988/89 - $8,5000

Objectives: To investigate the feasibility of using micro sprinklers as a frost protection on tree fruits in the Okanagan and on Vancouver Island. Both undertree and overtree systems will be evaluated. The degree of protection obtained will be determined by collecting temperature, relative humidity and wind speed data and observing the fruit set achieved with various treatments.

Summary: Utilizing micro sprinklers for frost protection offers producers an opportunity to expand the acreage that may be protected by irrigation methods. Micro sprinklers can be used to reduce application rates thereby increasing the acreage that can be covered with a set flow rate.

D.A.T.E. funding has been used to obtain data recording equipment required to monitor crop temperature before and after the irrigation system is turned on. Measuring crop temperature throughout the frost cycle will help determine the number of degrees protection achieved.

No frost events were recorded at the sites in the spring of 1988. The project will continue for the next five years.

TESTING OF BACTERIAL KIDNEY DISEASE VACCINE FOR FARMED SALMON

Project Number: 260

Supervision: Dr. Allan J. Castledine, Provincial Aquaculture Production Specialist, Victoria, B.C.

Co-operators: Ms. Joan McKay, United Hatcheries Ltd., Halfmoon Bay, B.C.
Aqua-Health Ltd., Charlottetown, Prince Edward Island

Branch: Aquaculture and Commercial Fisheries

Funding: D.A.T.E. 1988/89 - $7,000

Objective: To field-test a new vaccine for its efficiency in preventing bacterial kidney disease in farmed chinook salmon.

Summary: Bacterial kidney disease (BKD) is the most serious threat to the success of salmon farming in British Columbia with losses of stock between 10% and 90% over the two year grow-out cycle. It is a chronic bacterial infection which causes the heaviest mortality in the second year of growth. Any in-roads in preventing the disease will improve the economics of salmon farming. Development of effective vaccines has been slow because of the nature of the bacterium and the difficulty in culturing large quantities for vaccine production. Crude vaccines tested to date have had low effectiveness. However, even minor improvements can have a major effect on profitability.

Protocol: Fifty thousand, 8 gram chinook smolts were obtained from Rosewall United Hatcheries. Twenty-five thousand were used as a control group which received an injection of 0.5ml of a bivalent vaccine for vibriosis and furunculosis. The test group, also 25,000 fish, were administered 0.5ml of a trivalent vaccine for vibriosis, furunculosis and bacterial kidney disease.

The smolts remained in fresh water for four weeks prior to introduction to salt water where the two groups are being held under identical conditions. The fish will be held over a two year period and monitored for losses to BKD and other infectious agents.

Preliminary Observations: After four weeks in fresh water, the test group had increased in size to an average of 10.9 grams as compared to 14.6 grams for the control group. The test group did show high antibody titres to the causative organism, Renibacterium salmoninarum. Both test and control groups had clinical BKD positives. However, 5% fewer mortalities occurred in the test group. This trend is encouraging but not definitive. The most serious losses to BKD occur in the second year in salt water so this year's results will be of great interest. The effect of the initial growth depression on ultimate performance will be carefully monitored.

JAPANESE MANAGEMENT OF ALGAL BLOOM EFFECTS IN MARINE FISH CULTURE

Project Number: 261

Supervision: Edward A. Black, Head, Aquatic Studies Unit, Aquaculture & Commercial Fisheries, Victoria, B.C.

Co-operators: Dr. Shiroh Uno, Head, Environmental Studies for Fisheries Grounds, Oceanography Division, Seikai Regional Fisheries Research Laboratory, Nagasaki, Japan

Mr. Bob Baden, President, Aquaculture Association of British Columbia, Nanaimo, B.C.

Branch: Aquaculture and Commercial Fisheries

Funding: D.A.T.E. 1988/89 - $3,450

Objectives: To help fish farmers control the level of plankton mediated mortalities by reviewing Japanese techniques for mitigating these effects.

Summary: Dr. Uno reviewed, for a crowd of about 40 farmers and members of their support industries, the history, techniques and effectiveness of Japanese efforts to limit the losses experienced in fish farming due to plankton blooms.

Several novel techniques were discussed, most of which are effective only in particular circumstances. The most effective techniques are a combination of a joint industry-government early warning system and on-site mitigation. The most effective mitigation techniques have been relocation of the net cages as the bloom develops and the use of clays to precipitate certain of the troublesome algal species.

Private discussions were held on this subject with several members of the industry and several individuals from their support industries.

A PRODUCTION AND ECONOMIC ASSESSMENT OF PRESCRIBED GRAZING OF SHEEP ON FOREST CLEARCUTS

Sheep being worked through portable chute system.

Project Number: 262

Supervision:	Ted Moore, District Agrologist, Kamloops
Branch:	Development and Extension, Southern Interior Region
Co-operators:	Thompson-Nicola Sheep Grazers Association B.C. Forest Service, Clearwater
Funding:	D.A.T.E. 1988/89 - $ 2,000 B.C.F.S. 1988/89 - $15,000

Objective: To make an economic assessment of prescribed grazing of sheep on clear-cuts and compare this to sheep production on irrigated pasture. This is part of a larger project involving B.C. Forest Service and Thompson-Nicola Sheep Grazers Association to assess both the silvicultural impact of sheep grazing and the practicability of clear-cut grazing for sheep producers.

Summary: The D.A.T.E. funds were used to purchase a portable sheep handling facility (A.J. Ewe-Handle-Her Equipment) and ear tags for animal identification. The handling equipment worked very well for sorting sheep for weighing, treatment and shipping.

A total of 1,526 sheep (ewes and lambs) were grazed on forest clear-cuts in the Otter Creek watershed, northeast of Vavenby. A representative sample of these sheep were ear tagged and weighed at monthly intervals from May to September (lambs were shipped out in August).

Results from this project have shown it possible to obtain live-weight gains on lambs of 40lbs (18kg) during a 90 day grazing season, an average of .4lbs (.2kg) per day.

Over a 130 day grazing period, ewes also gained weight, an average increase of 19.25lbs (8.7kg), indicating an adequate level of nutrition. These weight gains are comparable to results obtained in previous years and from other grazing sites in 1988.

In spite of the relatively good live-weight gains, an economic analysis comparing returns on clear-cuts to returns obtainable from rented irrigated pasture, indicates a difference in net return of approximately $9.00 per head in favour of the pasture. The two major factors responsible for this difference are the higher costs of grazing clear-cuts (labour, trucking and losses) and the higher weight gains on pasture (an additional 20lbs (9kg) per lamb).

This economic analysis would indicate that, in order to attract sheep producers to clear-cut, payment of $8 to $10 per head will be required. The forest industry will need to determine if the silvicultural benefits obtained from sheep grazing provide an economical alternative to other methods of vegetation management.

INTEGRATED PEST MANAGEMENT (IPM) OF COLE CROPS

Helene Content inspecting Brussels sprouts for pests.

Project Number: 263

Supervision: Mark Sweeney, Vegetable Specialist, Abbotsford
Henry Gerber, Entomologist, Cloverdale

Co-operators: Ward Strong, MonAgro Consulting
Helene Content, Project Contractor
Dr. Bob Vernon, Research Entomologist, Agriculture Canada
John Quapp, Fieldman, Empress Foods Ltd.
Bert Van Dalfsen, Engineering Branch
Several Fraser Valley growers

Branches: Development and Extension, South Coastal Region
Crop Protection Branch, Engineering Branch

Funding: D.A.T.E. 1988/89 - $6,500
Fraser Valley Cole Crop Growers Assn. - $1,000
D.A.T.E. 1989/90 - $6,000
Participating Growers - $1,500

Objectives: 1) To develop, demonstrate and implement a self-supporting, privately operated integrated pest management (IPM) program for cole crops.

2) To demonstrate effective sprayer calibration, adjustment and technique.

Summary: Cole crop production in B.C. is valued at $10,000,000 (farm gate). Insect pest control represents a large percentage of production costs. Losses due to insect damage and contamination are high, particularly on crops shipped to processors.

In other crops (e.g. onions, carrots), IPM programs have been developed which provide growers with weekly information on pest levels. Sprays are applied only when necessary and at the optimum time. Problems (i.e. lack of control) are detected early enough to enable additional measures to be taken. In 1988, nine co-operating Brussels sprout growers were chosen. Starting in June, fields were inspected weekly and counts taken of predators, parasites and all potential pests from pre-set, randomly selected sample areas. In addition, several growers' sprayers were put through a rigorous testing procedure.

The following summarizes what has been learned to date:

1) growers who based their spray program on detected pest levels were able to harvest crops free from insect damage or contamination;

2) there were large differences between fields in the type and number of pests present. Monitoring must be field specific. In some fields, insect levels remained very low and growers were able to reduce the number of sprays required to produce a marketable crop;

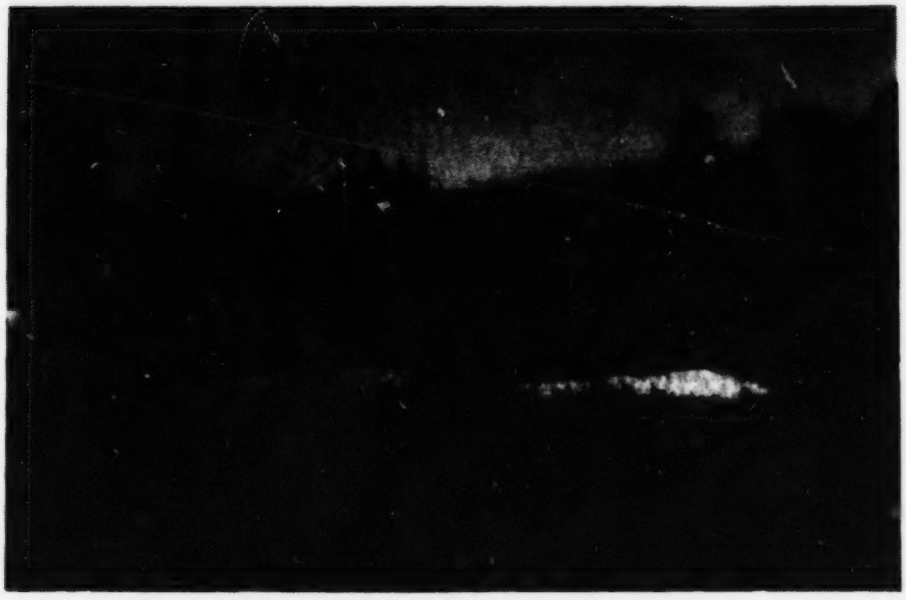
3) for a long season crop such as Brussels sprouts, fairly high insect populations and associated damage can be tolerated early in the season as long as the grower can reduce the levels to near zero by the time of formation of the sprouts;

4) excellent information was obtained on the relative field performance of the various registered insecticides;

5) sprayer evaluations revealed some flaws - inadequate pressure at the boom, worn nozzles, drops too short - but most growers' rigs performed reasonably well in the field;

6) the 1988 experience suggests that the time taken to monitor each field can be reduced greatly. This time saving will be critical if this program is to become a feasible, self-supporting service. In 1988, further refinements of the sampling procedure will be undertaken.

EFFECT OF ANTAGONISTIC PLANTS ON APPLE REPLANT DISEASE



Nematode sampling after growing antagonistic plants for several months.

Project Number: 265

Supervision: John Yorston, Plant Pathologist, Kelowna

Project Staff: Linda Edwards and Diane Thomas of Integrated Crop Management Inc.

Co-operators: Dr. Thierry Vrain, Nematologist, Agriculture Canada, Vancouver
Dr. Raj Utkhede, Agriculture Canada Research Station, Summerland

Branch: Crop Protection

Funding: D.A.T.E. 1988/89 - $2,700
Integrated Crop Management Inc. - $1,250

Objectives: To promote good growth of young fruit trees by lowering root lesion nematode density and harmful fungi in orchard soils using antagonistic plants.

Summary: Poor growth of young apple trees planted into old orchard land is a recognized problem in the Okanagan Valley. Soil organisms, including fungi and nematodes, have been identified as causes of poor tree growth. Soil fumigants are generally recommended for control. However, they are costly and dangerous to the applicator and the environment. If a biological method such as growing antagonistic plants will overcome the replant problem, it would have practical application as well as being environmentally sound.

The results of this project clearly show that the marigold Tagetes patula cv. "Harmony" will, in one season, reduce nematode populations to very low levels. The grasses creeping red fescue and red top reduced nematode levels but populations increased under barley and canola.

It is very clear that marigolds will effectively control the root lesion nematode in one growing season. The species of marigold tested can be recommended as a green manure crop on orchard land left out of production for the year prior to planting. The usefulness of intercropping marigolds to reduce nematode populations in existing young plantings should be investigated. Growing grass in the aisle between tree rows is a common horticultural practice. This experiment indicates that creeping red fescue and red top would be desirable for this purpose because they suppress nematode levels.

Another conclusion which can be drawn from this study is that cereals should not be used as a green manure crop because they will increase nematode populations.

MONITORING APPLE SCAB IN THE NORTH OKANAGAN FOR FUNGICIDE RESISTANCE

Collecting apple scab spores for resistance testing.

Project Number: 266

Supervision: John Yorston, Plant Pathologist, Kelowna

Project Staff: Tania Jones, Sarah Towgood

Co-operators: Peter Sholberg, Agriculture Canada, Summerland
Ivor Marshall, Okanagan North Growers Co-op, Winfield

Branch: Crop Protection

Funding: D.A.T.E. 1988/89 - $2,500
Okanagan North Growers Co-op/
B.C. Fruit Packers - $2,500
Cyanamid Canada - $1,000

Objectives: To identify the distribution of apple scab resistance to the fungicides benomyl and dodine and to assess the potential for the development of resistance in the future.

Summary: Apple scab, a common disease in wet years, causes severe losses by disfiguring the fruit surface. Scabby fruit is diverted for manufacture of juice.

A similiar project in 1987 showed that 34% of 147 samples tested had dodine (Cyprex, Equal) resistance and 14% had benomyl (Benlate) resistance. This information raised many questions about whether untested orchard could rely upon these chemicals for apple scab eradicant control. The only alternative in a resistant orchard is to switch to an expensive protectant spray program. This project was designed to determine the extent and progress of resistance in the north Okanagan by sampling a large number of orchards.

Of the 329 samples collected in 1988, 260 had spore germination counts high enough to test for fungicide resistance. Over all, 65% of samples had resistance to dodine (Cyprex, Equal) and 40% to benomyl (Benlate). In Kelowna, 82% of 98 samples were resistant to dodine but in the areas south of Kelowna the incidence of scab and resistance to fungicides was much lower. Insufficient samples were received from Creston to draw conclusions.

As a result of this project, following consultation with Ontario, the scab eradicant chemicals Cyprex, Equal, Benlate and Easout were deleted from the 1989 Tree Fruit Production Guide. Once resistance reaches the high levels found in this

survey, control is no longer assured. A protectant program of frequent sprays before rainfall will be recommended in 1989. Drier southern areas of the Okanagan with a low incidence of scab and infrequent use of scab fungicides can still use the chemicals. The picture is unclear in Creston, an area of high fungicide use and serious apple scab, because 1988 was a dry year with very little scab present in the orchards for sampling. More samples will be needed to check if resistance has become a problem in Creston.

IMPROVING MARKETABILITY OF B.C. PRODUCED HORSES

Project Number: 267

Supervision: Mr. Al Wahl, Livestock Specialist (has now left the ministry)
Mr. Mark Robins, Horse Industry Specialist, Cloverdale

Co-operators: B.C. Horse Improvement Program

Funding: D.A.T.E. 1988/89 - $15,000

Objectives: The basic aim of the program is to identify superior animals within each breed, with the major criteria for selection being form (conformation) as related to function (performance), with the major emphasis being placed on the athletic ability of the horse.

Based on the impressive results of the Alberta Horse Improvement Program and the early Kootenay Horse Improvement Program (1981-1982), the B.C. Horse Industry Committee embarked on a long term project designed to evaluate and improve the quality of horses bred in this province. The Alberta program has been on-going for ten years and has shown results in improved performance and conformation of approved horses resulting in increased sales both nationally and internationally.

In 1988, the British Columbia Horse Improvement Program completed its third year with an increase in participation of 240% over 1987.

The objectives of the Horse Improvement Program are to aid in:

1) improvement in the quality of B.C. bred and owned horses;

2) identification and advertisement of the superior horses, breeders and trainers in the province;

3) establishment of markets for B.C. bred and owned horses;

4) recognition by the government of British Columbia of the horse industry in British Columbia.

Summary:

1) The scope of the evaluation was considerably enhanced and expanded by inclusion of twelve additional breeds. The original eight breeds seen in 1986 and 1987 (American Saddlebred, Appaloosa, Arabian, Morgan, Paint, Pinto, Quarter Horse and Welsh) were joined by Anglo-Arabian, Half-Arabian, Canadian Sport Horse, Connemara, Fjord, Draft Horse (Percheron), Hungarian, Miniature Horse, Peruvian Paso, Tennessee Walking Horse, Thoroughbred and Westphalian. The inclusion of these twenty breeds in the 1988 Horse Improvement Program shows the true diversity of horse breeding and ownership in this province.

2) With the inclusion of these breeds of larger animals, i.e. Thoroughbred, Sport Horse, Westphalian, the halter division was expanded to include three year olds as many of these breeds do not begin serious performance training of their young stock until their fourth year. The 1988 program allowed these owners and breeders the option of an evaluation in either halter or performance for their three year old horses.

3) The performance divisions were upgraded to better demonstrate the abilities and skills of young horses at the very beginning of their performance careers. Two age divisions were offered: Junior Horse (three and four year olds) and Senior Horse (five and six year olds). The performance divisions were: Dressage, Over Fences, Saddle, Western and Driving. The entry in the 1988 performance was the highest since the inception of the Horse Improvement Program (15% of entries) and is a good indication of the acceptance of the "form to function" concept. As additional incentive, prize monies in the performance divisions were at a higher ratio.

4) The certificates issued by the Ministry of Agriculture and Fisheries were, again, awarded to superior entries in each breed and performance division. New for 1988 was the addition of seals for excellence to the certificates. The percentage range for the seals was calculated as an average of the three judges:

Platinum Seal	- 90-100%
Gold Seal	- 80-89%
Silver Seal	- 70-79%
Bronze Seal	- 60-69%

As an indication of the high standard of horse presented to the three judges, one Platinum Seal and sixty Gold Seals were awarded in halter and performance.

5) As part of the Grants/Prize money category, travel assistance monies were granted to those breeders and exhibitors travelling from Vancouver Island or beyond Hope. While the money granted was nominal, it was definitely appreciated by those exhibitors.

In summary, these new concepts were positive and constructive growth for the B.C. Horse Improvement Program by recognizing the different needs of the breeder and owner and so creating a distinct, British Columbia program.

VEGETABLE HARVEST AID

Harvesting cauliflower with prototype vegetable harvest aid.

Project Number: 268

Supervision: Bert Van Dalfsen, Mechanization Engineer, Abbotsford

Co-operators: Cloverdale Lettuce and Vegetable Co-op

Branch: Soils and Engineering

Funding: D.A.T.E. 1988/89 - $4,500

Objectives: To modify the B.C.M.A.F. harvest aid to eliminate all conveyance transfer points to reduce handling damage of vegetables during harvest.

Summary:

Harvesting methods of many of B.C.'s fresh vegetables is very labour intensive and prone to handling damage. In an effort to address these concerns, the B.C.M.A.F. Soils and Engineering Branch developed a prototype vegetable harvest aid.

In 1988, the prototype was modified to eliminate all conveyor transfer points to minimize damage. The harvest aid consists of a conveyor mounted on a tandem wheeled trailer. The conveyor extends over three cauliflower beds allowing the heads to be cut, trimmed and placed on the flighted conveyor belt. The conveyor then transfers and elevates the cauliflower onto the trailer. Two people remove and pack the cauliflower into tote bins on the trailer. The elevating/packing section of the conveyor is height adjustable to allow the packers to fill tote bins stacked eight high (6 feet). The trailer (wagon) is equipped with two trolley tracks which allow four empty stacks of tote bins to be moved, one by one, into position for packing, to be filled and then moved away to make room for the next stack. The trolley track and dolly combination has solved the material handling problems on the wagon. The stacks of tote bins are removed from the wagon by fork lifts.

The harvest aid has worked well with cauliflower on four farms during the 1988 season. Cauliflower is one of the most easily bruised crops during harvest. The harvest aid will be tested on cabbage and other crops in 1989.

INTERNATIONAL SYMPOSIUM ON HIGH TECHNOLOGY IN PROTECTED CULTIVATION

Project Number: 269

Supervision: Brian Mauza, Provincial Greenhouse Specialist, Abbotsford

Co-operators: Greenhouse Vegetable Growers Research Council

Branch: Development and Extension, South Coastal Region

Funding: D.A.T.E. 1988 - $2,000
B.C. Greenhouse Vegetable Growers Research Council - $1,482

Objectives:

1) To retrieve information from experts developing new and advanced technologies in the greenhouse industry for application in B.C.

2) To introduce these new concepts to British Columbia for improving management, production and handling efficiencies of greenhouse vegetable crops.

Summary:

Over 135 persons from 18 countries participated in this special symposium organized by the International Society for Horticultural Science and the Society of Agricultural Meteorology of Japan.

The organized activities consisted of a Trade Show, special lectures on "Horticulture in the High Technology Era", the Symposium on High Technology and associated industry tours.

The research in high technology areas can be condensed into five key areas. These are mass propagation (tissue culture, micro-propagation), robotics (including artificial intelligence and expert systems), advanced production systems (hydroponics and plant factories), environmental controls (sensors, computer programs) and greenhouse design and heating.

Pest control and other economic aspects were not addressed. Some insight into waste management concerns were also presented. These centred on disposal of plastic and organic wastes. Advances in tissue culture systems should help minimize contamination in "in vitro" systems by eliminating sucrose from the rooting medium. Other findings were presented which might help reduce plant loss during acclimatization. These findings will have an impact on our greenhouse and nursery industries. Researchers in Japan have used micro-propagation techniques to introduce genetic disease resistance into crops. This may shorten the time taken by plant breeders to produce varieties resistant to diseases which have a significant economic impact on our greenhouse industry. Unfortunately, little, if any, plant breeding is carried out in Canada in support of the greenhouse industry.

Many researchers are developing systems to automate mass propagation systems. Both Japan and the United States have developed robots for this purpose. The applications of this technology to the hothouse tomato industry is possible. Researchers indicated that most hardware is available. It is the application to specific tasks such as transplanting, harvesting and de-leafing where more development should be encouraged. This is identified as a problem of immediate interest to our industry and one which could be pursued through the B.C. Institute of Technology or B.C. Research.

Researchers are also developing sensors which are necessary for the production feedback systems to control crop nutrition. With reliable sensors, plant requirements can more accurately be predicted and controlled. This type of system is in demand by our industry but may take five years or more before it is available.

This symposium was a "snapshot" of research directed at protected cultivation. Most of the results require further refinement before they can become off-the-shelf technology.

ADVANCED CONCRETE CONSTRUCTION TECHNOLOGY IN CAST IN PLACE HORIZONTAL SILO

Pouring floor slab containing silica fume admixture.

Project Number: 270

Supervision: Philip D.A. Johnson, Agricultural Engineer, Abbotsford

Project Staff: R.B. Scott, Agriculture Officer, Abbotsford

Co-operators: Mike Dykshoorn, Owner/Contractor
Jim Neill, P. Eng., Hardy BBT, Consultant
Richard Atkinson, Target Products Ltd.
Rempel Concrete, Ready-Mix Supplier

Branch: Soils and Engineering

Funding: D.A.T.E. 1988/89 - $2,200

Objectives:

1) To demonstrate and promote the application of advanced concrete construction technology in a cast-in-place concrete horizontal silo.

2) To demonstrate corrosion and acid resistant concrete surfaces created by the addition of an admixture (silica fume).

Summary:

A closer look at timber silo construction was needed due to changes in the new timber design code and the proposed Canadian Farm Building Code for B.C. Those changes call for significant upgrading of the current timber requirements for silo design resulting in higher construction costs. In addition, pressure treated lumber can and will shrink to permit air leakage resulting in silage spoilage.

Many of the reinforced concrete structures currently in use as an alternate to timber silos have exhibited deterioration in concrete areas exposed to silage acids.

The concrete silo design chosen for this project is Plan No. 372-34 developed by the Canada Plan Service (CPS) with enhanced structural integrity and longevity due to admixtures. This silo design offers superior forage conservation potential and competitive construction cost when compared to the conventional timber design and has not previously been constructed in B.C.

The walls and most of the floor slab were cast in type 10 portland cement containing fly ash. This was done to determine the performance of concrete with fly ash in resisting chemical attack from silage acids and to allow comparison with the admixture in part of the floor.

Three floor panels approximately 10 feet by 18 feet each were cast using silica fume concrete at varying dosage rates of silica fume admixture added on site.

Slide series will be developed illustrating construction steps. Fact sheets will be produced describing concrete technology. During the dairy producers short course in 1989, a field day will be held at the silo.

Private contractors and engineering firms will be provided plans, photos and fact sheets to ensure concrete technology is available in the private sector.

METRIBUZIN POST-EMERGENCE ON PROCESSING PEAS

Metribuzin post-emergence on processing peas.

Project Number: 271

Supervision: Roy Cranston, Provincial Weed Specialist, Cloverdale

Project Staff: Dr. Jack Freeman, Agassiz Research Station (Retired)

Co-operators: Lower Mainland Horticultural Improvement Association

Branch: Crop Protection

Funding: D.A.T.E. 1988/89 - $10,000
D.A.T.E. 1989/90 - $10,000

Objectives: The formulation, sale and distribution of dinoseb products was suspended in 1986 due to concerns regarding carcinogenic and developmental toxicity. This project is intended to develop, seek registration for (full or minor use) and demonstrate alternatives to dinoseb herbicide in fresh market and processing peas, beans, cucurbits and potatoes. Development, demonstration and adoption of alternatives will serve to lessen the already significant competitive advantage of imported crops.

Summary: Several trials were conducted during the past year in search of a substitute for dinoseb for weed control in bush beans, cucumbers, processing peas and potatoes. Herbicides were tested alone and also in mixtures in order to broaden the weed control spectrum.

Bush Beans

Lactofen, alone and in combination with clethodim, was tested as pre-emergence and post-emergence treatments. The post-emergence treatments resulted in satisfactory to good weed control but caused severe crop injury. When applied pre-emergence, the weed control was excellent with no crop injury. Monolinuron also showed promise when applied post-emergence. In another post-emergence trial, fomesafen was tested alone and in mixture with bentazon and/or with fluazifop-P-butyl or sethoxydim. All treatments gave good broad-leaved weed control but only mixtures containing either fluazifop-P-butyl or sethoxydim gave satisfactory barnyard grass control.

Cucumber

Naptalam applied pre-emergence and post-emergence was compared to chloramben applied pre-emergence. Only the higher rates of both herbicides gave satisfactory weed control. They appeared not to affect the crop.

In another trial, trifluralin was tested as a post-emergence directed and incorporated treatment. This treatment resulted in very good broad-leaved weed control with only a few hairy galinsoga and redroot pigweed seedlings escaping. Crop yield was not affected detrimentally.

Processing Peas

Six trials were conducted including pre-plant, pre-emergence and post-emergence treatments. Trifluralin or ethalfluralin applied pre-plant incorporated, followed by metribuzin pre-emergence, gave excellent weed control. The crop was not affected by treatment. In a pre-emergence trial, lactofen and metribuzin were tested along and in mixture. All treatments gave very good to excellent broad-leaved weed control. Lactofen alone did not control barnyard grass. In an early post-emergence trial, bentazon, MCPA amine, MCPA salt, BAS 35140 and cyanazine, or cyanazine plus MCPA salt, gave satisfactory broad-leaved weed control. The addition of sethoxydim controlled barnyard grass with no detrimental affect on the crop.

Potatoes

Metrobromuron was applied alone or in mixture with metribuzin or paraquat as pre-emergence treatments. Only the mixtures gave satisfactory broad-leaved weed control. Bentazon and metribuzin were tested in combination with sethoxydim. The metribuzin-sethoxydim treatment gave excellent broad-leaved weed and barnyard grass control. Several graminicides were tested for annual grass and quackgrass control with promising results.

Registration

A submission has been made through the minor use program for registration of metribuzin as a post-emergence treatment for processing peas.

DEMONSTRATION OF AGRICULTURAL TECHNOLOGY IN THE SOUTH COASTAL REGION

Airflow pollination in use at Vantreight Farms in June 1988.

Project Number: 275

Supervision: Wayne Wickens, Regional Director, South Coastal Region

Co-operators: Brent Warner, New Crop Development Specialist
Ron Charles, District Agriculturist
Ronny Quay, Horticultural Technician
Dr. Bill Lanterman, Agriculture Canada
Vantreight Farms, Victoria
Rod Chilton, Contract Climatologist
Nick Pyke and Peter Alsbach, M.A.F. New Zealand
Sumas Mountain Conservation Society.

Branch: Regional Extension Services, South Coastal

Funding: D.A.T.E. 1988/89 - $8,000
Vantreight Farms - $1,000

Objectives: To enhance the adoption of new technologies in the South Coastal Region by demonstrating new techniques and by observing, collecting and disseminating relevant information found outside the region.

Summary: An airflow pollinator, obtained from New Zealand, was evaluated for its potential to improve pollination of early flowering crops such as kiwifruit and Asian pears. Results from the Sidney greenhouse test were extremely encouraging and the data will be finalized once all the seed counts from the harvested fruit have been done. It is already known that the pollen purchased from California is less than 50% actual pollen by weight and this must be considered when calculating application rates. In addition, it is known that male pollen availability on greenhouse grown male plants is enormous and is extremely easy to collect and that liquid pollen application can be successful with good pollen and proper equipment but can also be a complete failure.

A ten minute video was made which focussed on Tansy Ragwort, its habitat, identification and control in pasture land. Tansy Ragwort is a noxious weed which is toxic to livestock, particularly horses and cattle. It is spreading rapidly on roadsides, dykes and pastures in parts of the lower mainland and southern Vancouver Island. The video, which was co-produced by the Sumas Mountain Conservation Society and the B.C.M.A.F., will alert livestock producers to the problems associated with the plant.

DEMONSTRATION OF AGRICULTURAL TECHNOLOGY IN THE NORTH CENTRAL REGION

Project Number: 276

Supervision: Terry Dever, Regional Director, North Central Region

Co-operators: L. Allan Blair, Senior Agrologist
Ken McAra, District Agriculturist
Jennifer O'Halloran, Field Crops Agrologist
Ross Green, Livestock Agrologist
B.C. Fox Breeders' Association
Prince George Cattleman's Association
Agriculture Canada
B.C. Branch Alberta Forage Seed Council
Canadian Seed Growers' Association
Alberta Agriculture
B.C. Peace River veterinarians and cattle producers

Branch: Regional Extension Service, North Central Region

Funding: D.A.T.E. 1988/89 - $8,000

Objectives: To enhance the adoption of new technologies in the North Central Region by demonstrating new techniques and by observing, collecting and disseminating relevant information found outside the region.

Summary: A B.C. Fox Breeders' Live Fox Show and Education Day was held November 5th and 6th 1988 in Hudson's Hope. Ms. Laurie Connor of the Nova Scotia Agricultural College in Truro, Nova Scotia, was the expert speaker contracted for the seminar. She spent the morning talking to 100+ fox breeders and other interested attendees on nutrition and the genetics of fox production. Ms. Connor's expertise was welcomed by the fox industry as there is little such information available from local sources. The text of the material presented will be made available to the B.C.M.A.F. extension offices in Fort St. John, Dawson Creek and Smithers and also to the B.C. Fox Breeders Association.

A Kodak Datashow Projection Pad was purchased in August 1988 and promptly used at two cattle marketing seminars to illustrate break-even analysis software. The Datashow unit enlarges the MacIntosh screen on an overhead projector thus enhancing the use of the MacIntosh personal computer for extension activities. The Datashow was used on six separate occasions for specific applications and has been demonstrated on several other occasions. It is proving to be a very useful tool in being able to use microcomputer technology with a larger group in explaining economic models and in making more professional presentations.

A Farm Safety Seminar was held October 1, 1988 at the Agriculture Canada Research Farm. Mr. S. Kyeremanteng, Co-ordinator, Farm Safety Program with Alberta Agriculture, conducted a seminar in the "Donahue" style and involved 25 local cattlemen in farm safety discussions. Other speakers and a fire extinguisher demonstration rounded out the field day. The seminar increased producer awareness of farm safety issues in the Prince George area.

As an alternative to importing expertise, transportation was provided for fifty farmers to attend the B.C. Peace River Forage Seed Marketing Seminar, held November 15, 1988 at Ryecroft, Alberta. The seminar was video-taped for future local use.

The use of certified seed by Peace River and other B.C. farmers was promoted through the development of a video. The video was introduced at the B.C. Provincial Seed Fair in Fort St. John on March 2 and 3, 1988.

A year-round Beef Cattle Health Program for the B.C. Peace River area was developed by a committee of producers, veterinarians and extension staff. Its content was delivered at three seminars held in the Peace River area in January 1989. A herd health calendar will be developed and updated as new products and techniques become available.

DEMONSTRATION OF AGRICULTURAL TECHNOLOGY IN THE SOUTHERN INTERIOR REGION

Specialty mushroom culture demonstration by
Al Oliver, District Horticulturist.

Project Number: 277

Supervision: Brian Baehr, Regional Director, Southern Interior Region

Co-operators:
John Vielvoye, Provincial Grape Specialist
Al Oliver, District Horticulturist
Peter Falsetta, Agricultural Officer
Mike Sanders, Provincial Tree Fruit Specialist
Ted Moore, District Agriculturist
Tim Watson, District Horticulturist
Windy Ridge Nursery
Agriculture Canada, Beaverlodge
Louis Brothers Winery
Peace Country Fruit Producers Co-op
Nice Mushrooms
Hugh Fallis
Shuswap Community Futures

Branches/ Regions: North Central Region
Crop Protection Branch
Soils and Engineering Branch

Funding: D.A.T.E. 1988/89 - $8,000

Objectives: To enhance the adaptation of new technologies in the Southern Interior Region by demonstrating new techniques and by observing, collecting and disseminating relevant information found outside the region.

Summary: The strategic plan for the development of the B.C. mushroom industry indicated opportunities for specialty products. Specialty mushrooms are fairly new to the market place and the technology for growing them has been difficult to obtain. A one day workshop with Dill Chalmers, of Western Biologicals, was held in Salmon Arm for interested producers as well as a follow-up demonstration of log and space bag cultivation of specialty mushrooms.

Production of saskatoon berries has been meeting with some success in the Peace River area of B.C. and Alberta. In addition, it is a crop that is quite adaptable and might provide an opportunity for diversification of some horticultural production in the Southern Interior Region. A tour to the Peace was organized to identify constraints to the development of a saskatoon industry such as varieties, pests, diseases, marketing, potential for wine, soil and climate limitations, and cultural aspects.

The tree fruit industry, in the mountain valleys of northern Italy, has evolved into high density systems much as is underway in British Columbia. Dr. Herman Oberhofer, from the Tyrol region of Italy, was invited to speak to grower meetings in two locations in the Okanagan to comment on the experiences in Italy and current developments and trends in production and marketing in Europe.

Northern California is a rapidly expanding apple growing area and, this year, was the host for the International Dwarf Fruit Tree Association meeting which, next year, will be held in British Columbia. The Provincial Tree Fruit Specialist travelled to Fresno to take part in the program, tour adjacent areas and invite the attendees to visit here in 1990.

Although the grape industry faced a critical situation through all of 1988, there were still a few of the larger growers interested in the demonstration of a mechanical harvester. The harvester, manufactured in New Zealand, was brought in for demonstrations in two locations in the Okanagan Valley. The machine did show some promise but had some real problems with the sandy hillside area of one of the demonstration sites.

High density plantings have brought some hope for economic viability to apple producers considering orchard renovation. The dwarfing rootstocks, which allow that kind of system for apples, have been available for decades but only recently have they been available for peaches and nectarines. A project has been initiated, in spring 1989, to establish a demonstration site to evaluate training systems, yield potential, advantages and disadvantages of these dwarf peach and nectarine rootstocks.

Development of water in remote areas is used to make better utilization of livestock range resources but lack of electrical power has severely limited the number of locations which can be developed economically. With the solar powered pump being developed and demonstrated, ranchers should be able to improve their range and forage managements by developing stock watering sites in key locations.